CLAIMS

1. A method of characterizing at least one of a three-dimensional position and a size of at least one electrically conductive mass within a defined space, the method comprising the steps of:

   a. providing a resistive medium having a periphery and a surface proximate to the space;

   b. connecting a series of spaced-apart electrodes to the resistive medium along the periphery;

   c. sending an AC signal through at least some of the electrodes and into the resistive medium, thereby capacitively coupling at least one mass to the resistive medium and creating a charge distribution, affected by the at least one mass, in the medium; and

   d. sensing the charge distribution and, based thereon, inferring at least one of the size and the position of the at least one mass relative to the surface.

2. The method of claim 1 wherein:

   a. an AC signal is sent into the resistive medium sequentially through at least some of the electrodes;

   b. for each AC signal sent into the resistive medium, a current level through the medium is measured through at least one other of the electrodes to form a set of measurements; and

   c. the inferring step comprises deriving the position relative to the resistive medium based on the measurements.

3. The method of claim 1 further comprising the steps of:

a. measuring a voltage difference between an electrode through which an AC signal is sent and an electrode through which the AC signal is not sent; and

b. inferring a two-dimensional location of a centroid of the at least one mass relative to the resistive medium based at least on locations of the electrodes and the voltage difference.

4. The method of claim 1 further comprising the step of sequentially sending AC signals through different ones of the electrodes and sensing current with other electrodes, the charge distribution being characterized based on current sensed through all of the electrodes.

5. The method of claim 1 wherein the resistive medium is in the form of a sheet.

6. A method of characterizing at least one of a three-dimensional position and a size of at least one electrically conductive mass within a defined space, the method comprising the steps of:

a. providing a resistive medium having a periphery and a surface proximate to the space;

b. connecting a series of spaced-apart electrodes to the resistive medium along the periphery;

c. sending an AC signal through at least some of the electrodes and into the resistive medium, thereby capacitively coupling at least one mass to the resistive medium;

d. measuring a voltage difference between an electrode through which an AC signal is sent and an electrode through which the AC signal is not sent; and

e. inferring a two-dimensional location of a centroid of the at least one mass relative to the resistive medium based at least on locations of the electrodes and the voltage difference.

7. The method of claim 6 wherein an AC signal is sent into the resistive medium sequentially through at least some of the electrodes, and further comprising the steps of:

a. for each AC signal sent into the resistive medium, measuring a current level through at least one other of the electrodes to form a set of measurements; and

b. using the measurements to characterize a charge distribution in the medium and, based thereon, inferring at least one of the size and the position of the at least one mass relative to the surface.

8. The method of claim 6 further comprising the step of sequentially sending AC signals through different ones of the electrodes and measuring voltage differences between different pairs of electrodes, the two-dimensional location being inferred based on voltage differences measured through all of the electrodes.

9. The method of claim 6 wherein the resistive medium is in the form of a sheet.

10. Apparatus for characterizing at least one of a three-dimensional position and a size of at least one electrically conductive mass within a defined space, the apparatus comprising:

a. a resistive medium having a periphery and a surface locatable proximate to the space;

b. a plurality of spaced-apart electrodes connected to the resistive medium along the periphery;

c. an AC source;

d. control circuitry for causing the AC source to send an AC signal through at least some of the electrodes and into the resistive medium, thereby capacitively coupling at least one mass to the resistive medium and creating a charge distribution, affected by the at least one mass, in the medium; and

e. circuitry for sensing the charge distribution and, based thereon, inferring at least one of the size and the position of the at least one mass relative to the surface.

11. The apparatus of claim 10 wherein:

a. the control circuitry causes the AC source to send AC signals into the resistive medium sequentially through at least some of the electrodes; and

b. the sensing circuitry measures, for each of the AC signals sent into the resistive medium, a current level through the medium through at least one other of the electrodes to form a set of measurements from which the position relative to the resistive medium is derived.

12. The apparatus of claim 10 further comprising:

a. circuitry for measuring a voltage difference between an electrode through which an AC signal is sent and an electrode through which the AC signal is not sent; and

b. circuitry for inferring a two-dimensional location of a centroid of the at least one mass relative to the resistive medium based at least on locations of the electrodes and the voltage difference.

13. The apparatus of claim 11 wherein the control circuitry causes the AC source to sequentially send AC signals through different ones of the electrodes and the sensing circuitry

senses current through other electrodes, the charge distribution being characterized based on current sensed through all of the electrodes.

14. The apparatus of claim 10 wherein the resistive medium is in the form of a sheet.

15. Apparatus for characterizing at least one of a three-dimensional position and a size of at least one electrically conductive mass within a defined space, the apparatus comprising:

a. a resistive medium having a periphery and a surface locatable proximate to the space;

b. a plurality of spaced-apart electrodes connected to the resistive medium along the periphery;

c. an AC source;

d. control circuitry for causing the AC source to send AC signals through at least some of the electrodes and into the resistive medium, thereby capacitively coupling at least one mass to the resistive medium;

e. circuitry for measuring a voltage difference between an electrode through which an AC signal is sent and an electrode through which the AC signal is not sent; and

f. circuitry for inferring a two-dimensional location of a centroid of the at least one mass relative to the resistive medium based at least on locations of the electrodes and the voltage difference.

16. The apparatus of claim 15 wherein the control circuitry causes the AC source to sequentially send AC signals through different ones of the electrodes and further comprising:

a. circuitry for measuring, for each AC signal sent into the resistive medium, a current level through the medium via at least one other of the electrodes to form a set of measurements; and

b. circuitry for characterizing a charge distribution in the medium based on the measurement set, the inferring circuitry inferring from the charge distribution at least one of the size and the position of the at least one mass relative to the surface.

17. The apparatus of claim 15 wherein the control circuitry causes the AC source to sequentially send AC signals through different ones of the electrodes and the measuring circuitry measures voltage differences between different pairs of electrodes, the two-dimensional location being inferred based on voltage differences measured through all of the electrodes.

18. The apparatus of claim 15 wherein the resistive medium is in the form of a sheet.